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GENETIC VARIABILITY FOR YIELD CONTRIBUTING TRAITS IN MUNG BEAN (*Vigna radiate* L.)

Hafiz Bashir Ahmad[1,*], Salsabeel Rauf[2], Ch. Muhammad Rafiq[1], Atta Ullah Mohsin[3], Umar Shahbaz[1] and Muhammad Sajjad[1]

[1]Pulses Research Institute, Faisalabad; [2]Oil Seeds Research Institute, Faisalabad
[3]Department of Agronomy, University of Agriculture, Faisalabad
[*]Corresponding author's e-mail: easahafiz@yahoo.com

Genotypic and phenotypic variation, heritability and genetic advance expressed as percentage of mean for yield and yield contributing traits were studied in 14 genotypes of mung bean **(***Vigna radiata* L.). Genotypic and phenotypic variances were high for number of pods per plant (18.60 and 19.50) and days to maturity (16.39 and 17.69). Heritability was high for 100-seed weight (0.99) and lowest for seed yield per plant (0.42). High heritability with high genetic advance as percentage of mean for number of pods per plant showed the additive gene effect for these characters. Analysis of variance for parameters showed the significant variations for all variables under consideration. Genotype 8010 produced maximum number of pods per cluster (3.72) and number of pods per plant (27.33). Maximum plant height (41.23) was recorded for genotype 8003 while genotype 98002 took maximum days to flowering (49.66) and days to maturity (86.66). Similarly, maximum 100-seed weight (5.64) and seed yield per plant (13.76) were recorded in genotypes 8004 and 8002, respectively. Existing variation may helpful for selection and further hybridization breeding program in future.
Keywords: Genetic Variability, Yield traits, Mung Bean

INTRODUCTION

Mung bean is a major pulse crop of kharif season in Pakistan. Its area and production was 136.1 (000 ha) 89.3 (000 t), respectively during 2012-13. Its family is Leguminaceae and native to Indo-Burma region of Asia. A great diversity is present for Mung bean breeders, worldwide. This diversity is helpful in developing high yielding genotypes of mung bean. Gupta *et al*. (1969) studied the genetic variation and heritable components of variation in chickpea 46 varieties and emphasized the selection on basis of 100 seed weight. Veeraswamy*et al.* (1973) emphasized the selection in Mash (*Vignamungo*) on plant height, number of pods per plant and seed yield per plant. Islam *et al*. (1999) studied the genetic variability and correlation between yield and yield components in mung bean and observed the significant differences among the various genotypes. Yimram*et al*. (2009) studied genetic variation in cultivated germplasm of mungbean for breeding for high yielding. He assessed broad sense heritability and estimated genetic advance for selection of major quantitative traits. High genetic variability, moderate to high heritability and genetic advance were found in yield contributing traits such as 100 seed weight, seed weight per plant, number of pods per plant. Phenological traits like plant height, days to flowering and days to maturity, high genetic variability was noted. Heritability and genetic advance were high for plant height but low for days to flowering and days to maturity. Gul*et al*. (2007) studied significant variation among the yield contributing traits. Hozyn *et al*. (2013) observed the significant variance among the yield and yield components. The phenotypic coefficient of variability (PVC) was approximately equal to the genotypic coefficient of variability (GVC) for most of the traits. Similarly, Narasimhulu *et al*. (2013) studied the genetic variability and character association in forty mungbean genotypes for different quantitative characters. Highest genotypic and phenotypic variances were observed for number of branches per plant, pods per plant, biological yield and harvest index. So, it is evident that genetic variability is very important for breeding programs. Therefore, present experiment was conducted to assess the genetic variability for the desirable character in mungbean genotypes. It will help in the selection of promising lines which can be used for further breeding program.

MATERIALS AND METHODS

The experiment was under taken at Pulses Research Institute, Faisalabad during summer 2010. Experimental site lies between 30.35-41.47°N latitude and 72.08-73.40°E longitude at an elevation of 184.4 m above sea level (Amir *et al.*, 2014). Experiment was laid out in Randomized Complete Block Design with three replications. Sowing was done in first week of July. Plant to plant and row to row distance 15 cm 30 cm were maintained respectively. Fourteen genotypes were evaluated for variation. These genotypes were:

1. 8001	4. 8004	7. 8007	10. 8010	13. NM-06
2. 8002	5. 8005	8. 8008	11. 8011	14. AZRI-06
3. 8003	6. 8006	9. 8009	12. 98002	

Data were collected on number of pods per cluster, pods per plant, number of clusters per plant, 100-seed weight and seed yield per plant. The data were statistically analyzed, means

were compared using Tukey test at 0.05 level of probability (Steel and Torrie, 1984). Estimation of heritability and expected genetic advance of variance components were estimated according to the formula given by Singh and Choudhary (1979). Heritability (h) genotypic variance/ phenotypic variance.

Heritability $(h) = \frac{\sigma^2 g}{\sigma^2 p}$

Where $\sigma^2 g$ and $\sigma^2 p$ are genotypic and phenotypic variances, respectively.

Genetic advance = $Kh^2 \sigma p$

Where,

K = selection differential at 5% selection intensity = 2.06

h^2 = heritability coefficient

σp = phenotypic standard deviation

RESULTS AND DISCUSSION

The genotypic and phenotypic variance and their coefficient of variation, heritability and genetic advance expressed as percentage of means have been presented in Table 1. The genotypic and phenotypic variation for number of pods per plant are high (18.60 and 19.45) and days to maturity(16.38 and 17.69) show high range of variability in these characters confirming the findings of Pande *et al*. (1975) and Malik *et al*. (1983) and same where supported by Yimram *et al*. (2009). Phenotypic coefficient of variation was also high for number of pods per plant (108%) followed by plant height (27.36). Genotypic co-efficient variation showed that pod per plant, plant height, days to maturity 100-seed weight, pod per cluster and seed yield per plant have large extent of variation that can be ascribed to genotypes. However cluster per plant showed lowest coefficient of variation (3.29). Broad sense heritability for 100-seed Weight is the highest (0.99) fallowed by number of pods per plant (0.95). Same were reported by Chowdhury *et al.* (1971) and Malik *et al*. (1983) highest heritability for 100-seedweight and number of pods per plant in mung been. The heritability is not sufficient to select the best individual. However heritability along with Genetic advance is more reliable as compared to only heritability Johnson *et al*. (1955). Genetic advance given as percent of mean shows differences among the characters noted. High heritability associated with Genetic advance is high for number of pods and plant height show that it is due to additive gene effects and selection may be effective on basis of these characters. Results are agreed with finding of Pande *et al*. (1975) and Malik *et al*. (1983). Pure line selection, mass selection and selection with pedigree breeding are effective in case of self-pollinated crops such as mung bean. Cluster per plant has high heritability (0.68) but low genetic advance shows non additive gene action and selection may not be effective. These findings confirm the studies of Rohman and Hussain (2003).

Data regarding the pods per cluster are shown in Table 2. Analysis of the data showed the differences for pods per

Table 1: Genetic parameter for various quantitative traits of mungbean genotypes

Characters	Genotypic variance	Phenotypic variance	Genotypic coefficient of variance	Phenotypic coefficient of variance	Environ-mental variance	Environmental coefficient of variance	Heritability	Genetic advance	Genetic advance (%)
Pod per cluster	0.133	0.153	12.60	13.53	0.020	22.38	0.867	0.70	24.17
Cluster per plant	0.199	0.288	7.38	8.89	0.090	13.72	0.689	0.76	12.63
Pod per plant	18.605	19.495	24.00	24.57	0.890	41.90	0.954	8.68	48.30
Plant height (cm)	8.814	9.863	8.23	8.71	1.049	14.54	0.894	5.78	16.04
Days to 50% flowering	10.573	11.081	7.46	7.64	0.507	13.03	0.954	6.54	15.02
Days to maturity	16.388	17.694	5.06	5.26	1.306	8.89	0.926	8.03	10.04
100-seed weight (g)	0.397	0.399	12.77	12.81	0.002	22.14	0.995	1.29	26.24
Seed yield per plant (g)	0.434	1.023	6.56	10.06	0.588	43.23	0.425	0.89	8.81

Table 2: Mean values of 14 genotypes for pod per cluster, cluster per plant, pod per plant, plant height (cm), days to 50% flowering, days to maturity, 100-seed weight (g) and seed yield per plant (g)

Genotypes	Pod per cluster	Cluster per plant	Pod per plant	Plant height (cm)	Days to 50% flowering	Days to maturity	100-seed weight (g)	Seed yield per plant (g)
8001	3.44 ab	6.55 ab	16.98 cdef	33.66 efg	37.66 i	73.00 h	5.51 a	10.11 bcd
8002	2.92 c	5.55 cd	22.07 b	35.86 cdef	39.66 hi	73.66 gh	5.21 b	13.76 a
8003	2.66 c	6.55 ab	15.53 def	41.23 a	42.33 efg	76.66 fg	4.52 e	8.06 defg
8004	2.85 c	6.20 abcd	16.10 def	32.60 gh	42.66 efg	77.66 ef	5.64 a	10.56 bc
8005	2.63 c	6.88 a	14.88 ef	33.30 fgh	40.66 gh	80.33 cde	5.51 a	9.40 bcde
8006	2.70 c	5.95 bcd	14.52 f	38.80 abc	43.33 def	76.33 fgh	4.45 ef	7.51 efg
8007	2.85 c	6.09 abcd	16.10 def	37.23 bcd	42.33 efg	79.66 def	4.82 d	8.80 cdef
8008	3.03 bc	5.66 bcd	17.53 cde	39.46 ab	44.33 cde	80.33 cde	3.31 g	6.66 fg
8009	2.91 c	6.30 abc	25.07 a	34.86 defg	45.33 bcd	80.66 cde	5.08 bc	13.49 a
8010	3.72 a	5.33 d	27.33 a	36.33 cdef	47.33 b	84.33 ab	4.35 f	13.44 a
8011	3.02 bc	6.44 abc	19.63 bc	39.43 ab	47.33 b	84.66 ab	4.85 d	10.89 bc
98002	2.85 c	5.86 bcd	17.26 cdef	36.46 bcde	49.66 a	86.66 a	5.10 bc	10.42 bc
NM-06	2.76 c	5.78 bcd	17.77 cd	35.23 defg	45.66 bc	83.33 abc	5.60 a	11.67 ab
AZRI-06	2.11 d	5.34 d	10.76 g	30.33 h	41.66 fgh	81.66 bcd	5.06 c	5.91 g
Tukey HSD Value	0.42	0.90	2.83	3.07	2.14	3.43	0.13	2.30

cluster. Maximum number of pods were recorded for genotype 8010(3.7267) and minimum for genotype AZRI-06(2.117).The data ranged from 2.76 to 3.44 for this parameter. The differences may be due to different genetic back ground among these tested genotypes. Results are supported by Tabsum*et al*.(2010).Significant differences were recoded of the data cluster per plant.Accession 8005 showed the maximum cluster per plant(6.88) while accession 8010 showed minimum(5.33).Remaining were in range from 6.55 to5.34 for the character noted. Pods per plant analysis showed the significant differences. Accession 8010showed the maximum number pods per plant but AZRI-06 showed the minimum number. Values of the parameter are in range from 10.76 to 25.07.These results are similar to the Sharma and Gupta (1994) noted significant differences for number of pods which was also confirmed by Islam *et al*. (1999). Plant height had significant difference. Maximum value for the plant height was shown by the accession 8003 and lowest for AZRI-06.Days to flowering and days to maturity had significant difference among the genotypes as shown accession 98002 maximum(49.66) and accession 8001toke minimum (37.66)days to flowering, days to maturity (86.66) maximum and minimum were (37.00). Analysis of the data regarding the 100-seed weight revealed the significant difference among the genotypes. Accession 8001 showed maximum (5.64 g) seed weight and minimum by the accession 8010(4.35 g).Other values for the parameter were from 5.52 to 4.52 1n range. Same were observed by Gul*et al*. (2007). Among the tested genotype for seed yield the significant differences were found. Accession 8001 had maximum seed yield (13.763 g) and AZRI-O6 had minimum (5.91 g) per plant .Range of the character for the observe parameter was from (13.49 g t0 6.66 g) per plant.These results are in line with those of Bhadra*et al*. (1988) and Islam *et al*.(1999) as they noted the differences among the tested genotypes of mung been.

CONCLUSION

The experiment was conducted to evaluate the performance of mung bean genotypes in AARI Faisalabad. Significant variations were observed for all parameters studied. Similar study on existing germplasm can be rewarding for the selection of more promising genotypes. Such genotypes with wide range of variation can be utilized for further breeding program.

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